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(54) Title: RECORDING MEDIUM HAVING DATA STRUCTURE FOR MANAGING REPRODUCTION OF STILL IMAGES RECORDED THEREON AND RECORDING AND REPRODUCING METHODS AND APPARATUSES
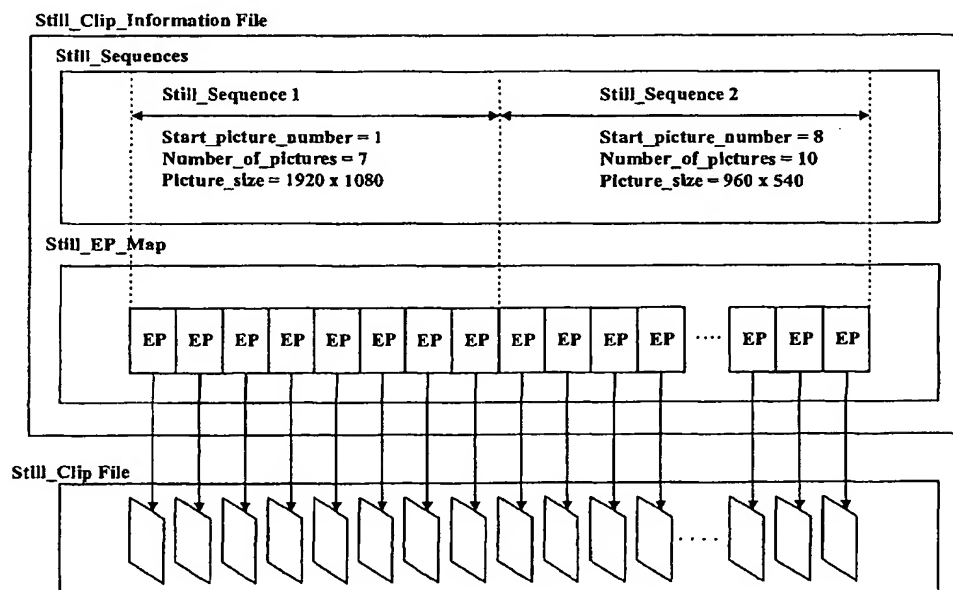
(57) Abstract: The recording medium includes a data structure having a clip stream file and a clip information file associated with the clip stream file. The clip stream file includes at least video data for a still image, and the clip information file including at least an entry point map. The entry point map includes an entry point, and the entry point provides at least an address of the still image.

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DESCRIPTION

RECORDING MEDIUM HAVING DATA STRUCTURE FOR MANAGING REPRODUCTION OF STILL IMAGES RECORDED THEREON AND RECORDING AND REPRODUCING METHODS AND APPARATUSES

1. TECHNICAL FIELD

The present invention relates to a recording medium having a data structure for managing reproduction of at least still images recorded thereon as well as methods and apparatuses for reproduction and recording.

2. BACKGROUND ART

The standardization of new high-density read only and rewritable optical disks capable of recording large amounts of high-quality video and audio data has been progressing rapidly and new optical disk related products are expected to be commercially available in the near future. The Blu-ray Disc Rewritable (BD-RE) and Blu-ray Disk ROM (BD-ROM) are examples of these new optical disks.

While the standard for BD-RE has been published, the standardization for high-density read-only optical disks such as the Blu-ray ROM (BD-ROM) is still under way. Consequently, an effective data structure for managing reproduction of still images recorded on the high-density read-only optical disk such as a BD-ROM is not yet available.

3. DISCLOSURE OF INVENTION

The recording medium according to the present invention includes a data structure for managing reproduction of at least still images recorded on the recording medium.

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In one exemplary embodiment, a recording area of the recording medium stores a clip stream file and a clip information file associated with the clip stream file. The clip stream file includes at least video data for a still image, and the clip

5 information file includes at least an entry point map. The entry point map includes an entry point, and the entry point provides at least an address of the still image. For example, the entry point provides at least a start address of the video data forming the still image.

10   In one exemplary embodiment, the entry point maps a presentation time of video data forming the still image to an address of the video data forming the still image.

In another exemplary embodiment, the clip stream file may include at least video data for more than one still image. In this

15 embodiment, the entry point map includes an entry point associated with each still image, and each entry point provides at least an address of the associated still image.

In a further exemplary embodiment, the recording area may also include other navigation information for reproducing one or

20 more still images. For example, this navigation information may include a playlist. In one exemplary embodiment, the playlist includes at least one playitem indicating at least a portion of the video data in the clip stream file to reproduce, and the portion of the video data in the clip stream file includes the still image.

25   In a further exemplary embodiment, the recording medium may also include another clip stream file, which includes audio data. In this embodiment, the playlist may further include at least one sub-playitem indicating a portion of the audio data to reproduce.

The present invention further provides apparatuses and

30 methods for recording and reproducing the data structure according to the present invention, and recording and reproducing slide shows according to the present invention.

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4. BRIEF DESCRIPTION OF DRAWINGS

The above features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying
5   drawings, in which:

Fig. 1 illustrates an exemplary embodiment of a recording medium file or data structure according to the present invention;

Fig. 2 illustrates an example of a recording medium having the data structure of Fig. 1 stored thereon;

10   Fig. 3 illustrates a method of managing still images for a high-density recording medium in accordance with one exemplary embodiment of the invention;

Fig. 4 illustrates an exemplary embodiment of managing reproduction of still image pictures and audio data using
15   playitems and sub-playitems in association with the embodiment of Fig. 3;

Fig. 5 illustrates an exemplary embodiment of the present invention where still image pictures have an unlimited display duration;

20   Fig. 6 illustrates an example of a sequential display slide show in which still image pictures are displayed for limited durations;

Fig. 7 illustrates an example of a browsable slide show performed according to exemplary embodiments of the present
25   invention; and

Fig. 8 illustrates a schematic diagram of an embodiment of an optical disk recording and reproduction apparatus of the present invention.

5. MODES FOR CARRYING OUT THE INVENTION

30   In order that the invention may be fully understood, exemplary embodiments thereof will now be described with reference to the accompanying drawings.

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A high-density recording medium such as a high density
optical disk, for example, a Blu-Ray ROM (BD-ROM), BD-RE, etc. in
accordance with the invention may have a file or data structure
for managing reproduction of video and audio data as shown in Fig.
5 1. Some aspects of the data structure according to the present
invention shown in Fig. 1 are the same as the well-known BD-RE
standard, as such these aspects will not be described in great
detail.

As shown in Fig. 1, the root directory contains at least one
10 BD directory. The BD directory includes general files (not shown),
a PLAYLIST directory in which playlist files (e.g., *.mpls) are
stored, a CLIPINF directory in which clip information files
(*.clpi) are stored, and a STREAM directory in which
MPEG2-formatted A/V stream clip files (*.m2ts), corresponding to
15 the clip information files, are stored.

The STREAM directory includes MPEG2-formatted A/V stream
files called clip streams files or just clip files. The A/V stream
includes source packets of video and audio data. For example, a
source packet of video data includes a header and a transport packet.
20 A source packet includes a source packet number, which is generally
a sequentially assigned number that serves as an address for
accessing the source packet. Transport packets include a packet
identifier (PID). The PID identifies the sequence of transport
packets to which a transport packet belongs. Each transport packet
25 in the sequence will have the same PID.

The CLIPINF directory includes a clip information file
associated with each A/V stream file. The clip information file
indicates, among other things, the type of A/V stream associated
therewith, sequence information, program information and timing
30 information. The sequence information describes the arrival time
basis (ATC) and system time basis (STC) sequences. For example,
the sequence information indicates, among other things, the number
of sequences, the beginning and ending time information for each

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sequence, the address of the first source packet in each sequence
and the PID of the transport packets in each sequence. A sequence
of source packets in which the contents of a program is constant
is called a program sequence. The program information indicates,
5 among other things, the number of program sequences, the starting
address for each program sequence, and the PID(s) of transport
packets in a program sequence.

The timing information is referred to as characteristic point
information (CPI). One form of CPI is the entry point (EP) map.
10 The EP map maps a presentation time stamp (e.g., on an arrival time
basis (ATC) and/or a system time basis (STC)) to a source packet
address (i.e., source packet number). The presentation time stamp
(PTS) and the source packet number (SPN) are related to an entry
point in the AV stream; namely, the PTS and its related SPN point
15 to an entry point on the AV stream. The packet pointed to is often
referred to as the entry point packet.

The PLAYLIST directory includes one or more playlist files.
The concept of a playlist has been introduced to promote ease of
editing/assembling clips for playback. A playlist file is a
20 collection of playing intervals in the clips. Each playing interval
is referred to as a playitem. The playlist file, among other things,
identifies each playitem forming the playlist, and each playitem,
among other things, is a pair of IN-point and OUT-point that point
to positions on a time axis of the clip file (e.g., presentation
25 time stamps on an ATC or STC basis). Expressed another way, the
playlist file identifies playitems, each playitem points to a clip
file or portion thereof and identifies the clip information file
associated with the clip file. The clip information file is used,
among other things, to map the playitems to the clip file of source
30 packets.

The general information files (not shown) provide general
information for managing the reproduction of the A/V streams
recorded on the optical disk.

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In addition to illustrating the data structure of the recording medium according to an embodiment of the present invention, Fig. 1 represents the areas of the recording medium. For example, the general information files are recorded in one or more general information areas, the playlist directory is recorded in one or more playlist directory areas, each playlist in a playlist directory is recorded in one or more playlist areas of the recording medium, etc. Fig. 2 illustrates an example of a recording medium having the data structure of Fig. 1 stored thereon. As shown, the recording medium includes a file system information area, a data base area and an A/V stream area. The data base area includes a general information file and playlist information area and a clip information area. The general information file and playlist information area have the general information files recorded in a general information file area thereof, and the PLAYLIST directory and playlist files recorded in a playlist information area thereof. The clip information area has the CLIPINFO directory and associated clip information files recorded therein. The A/V stream area has the A/V streams for the various titles recorded therein.

Video and audio data are typically organized as individual titles; for example, different movies represented by the video and audio data are organized as different titles. Furthermore, a title may be organized into individual chapters in much the same way a book is often organized into chapters.

Because of the large storage capacity of the newer, high-density recording media such as BD-ROM and BD-RE optical disks, different titles, various versions of a title or portions of a title may be recorded, and therefore, reproduced from the recording media. For example, video data representing different camera angles may be recorded on the recording medium. As another example, versions of title or portions thereof associated with different languages may be recorded on the recording medium. As a still further example, a director's version and a theatrical version of a title may be

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recorded on the recording medium. Or, an adult version, young adult
version and young child version (i.e., different parental control
versions) of a title or portions of a title may be recorded on the
recording medium. Each version, camera angle, etc. represents a
5 different reproduction path, and the video data in these instances
is referred to as multiple reproduction path video data.

Because of the large storage capacity of the newer,
high-density recording media such as BD-ROM still images may be
recorded and reproduced in an organized and/or user interactive
10 fashion, for example, as slideshows. The data structure for
managing reproduction of still images for a high-density optical
disk in accordance with embodiments of the present invention will
be described along with methods and apparatuses according to
embodiments of the present invention for recording and
15 reproducing still images.

A method of managing still images for a high-density
recording medium in accordance with one exemplary embodiment of
the invention records a plurality of still image pictures on a
high density recording medium such as a BD-ROM based in part on
20 the file structure and recording format of the BD-RE. As shown
in Fig. 3, the plurality of still images (e.g., JPEG, etc.) are
stored as a separate clip file Still_Clip File, separate from clip
files of audio and/or video data (e.g., movie video data).

After the clip file Still_Clip File is stored, a clip
25 information file Still_Clip_Information File corresponding to the
clip file Still_Clip File is created and recorded. The clip
information file Still_Clip_Information File includes an entry
point (EP) map and a plurality of sequences Still_Sequence 1 and
Still_Sequence 2. Each of the entry points contained in the entry
30 point map corresponds to a still image picture. For example, each
entry point provides a start address (e.g., source packet number)
of the beginning of the video data forming the associated still
image picture. . In one exemplary embodiment, each still image

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picture at least begins with an MPEG2 I (intra-coded) picture,
and therefore, the start address point to this I picture. In
another exemplary embodiment, the still image picture only
includes an I picture of video data

5   An entry point for a still image picture may include address
information and duration information for the still image picture.
Instead of or addition to the duration information, the entry
point may include a presentation time stamp (PTS) for the
associated still image picture. The entry point may further

10 include duration information or a presentation time stamp (PTS)
of audio data to be played simultaneously with the still image
picture.

        As shown in Fig. 3, each of the still sequences included in
the clip information file Still_Clip_Information File has the

15 information fields of 'Start_picture_number',
'Number_of_pictures', and 'Picture_size'. The name of each field
is self explanatory as to the information being conveyed in that
field. Each of the still image pictures associated with a sequence
have the same attribute and picture size.

20   As shown, the first sequence Still_sequence 1 has the
information that Start_picture_number=1, Number_of_pictures=7,
and Picture_size=1920×1080; and the second still sequence
Still_sequence 2 has the information that Start_picture_number=8,
Number_of_pictures=10, and Picture_size=960×540. Furthermore,

25 the start of the still sequence may be represented by an offset
picture number.

        The display of still images and audio data for playback
during display of still images may also be managed at the playlist
level according to exemplary embodiments of the present invention.

30 In one exemplary embodiment, playitems of a playlist are used to
manage reproduction of video data forming still image pictures
and sub-playitems of the playlist are used to manage reproduction
of audio data for playback with the still image pictures. A

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playitem may indicate reproduction of a single still image picture.
Or, a playitem may indicate reproduction of a group of still image
pictures, and also may indicate the display mode for the group.

      Fig. 4 illustrates an exemplary embodiment of managing
5 reproduction of still image pictures and audio data using
playitems and sub-playitems in association with the embodiment
of Fig. 3. As shown, the playitem of a playlist includes the
information 'IN_Picture' and 'Out_Picture', which indicates the
beginning and ending of a group of still image pictures Picture
10 1-Picture n in a clip file such as the Still_Clip File of Fig 3.
As discussed above with respect to Fig. 3, in an exemplary
embodiment, an entry point is associated with each still image.
The entry points form at least part of an EP map in a clip
information file associated with the clip file including the still
15 image pictures Picture 1 – Picture n. The entry points provide
the duration and/or PTS for each picture. As shown in Fig. 4,
the sub-playitem of the playlist includes the information
'IN_Time and 'Out_Time', which indicates the beginning and ending
of an audio stream in a clip file separate from the Still_Clip
20 File to be played in association with the still image pictures.
As further shown in Fig. 4, the 'IN_Time and 'Out_Time'
information provided by the sub-playitem is synchronized with the
'IN_Picture' and 'Out_Picture' provided by the playitem such that
during reproduction, an optical disk reproducing apparatus such
25 as described in detail below plays back portions of the audio data
for the second, third and fourth still image pictures Pictures
2, 3 and 4 in synchronization with the display of those pictures.

      While Fig. 4 illustrated display of still image pictures for
limited durations, Fig. 5 illustrates an exemplary embodiment of
30 the present invention where still image pictures have an unlimited
display duration. In this embodiment, the entry point associated
with a still image picture Picture 1 has been set to limitless.
As a result, an optical disk reproducing apparatus such as

described in detail below displays the still image picture indefinitely. Furthermore, Fig. 5 shows that the playlist including the playitem instructing reproduction of the still image picture Picture 1 also includes a sub-playitem instructing

5   reproduction of a portion of audio data in a separate clip file. When the display duration of the still image picture is limitless, the optical disk producing apparatus plays the audio data associated with the still image picture repeatedly with no limit, or alternatively for a prescribed number of repetitions. Also,

10 in response to the limitless duration of the still image picture, the optical disk reproducing apparatus displays the still image picture until user input is received.

Fig. 6 illustrates an example of a sequential display slide show based on the above-described embodiments in which still image

15 pictures are displayed for limited durations. In an example shown in Fig. 6, the optical disk reproducing apparatus performs a slide show, which sequentially displays a plurality of still image pictures stored in a clip file according to the duration information included in the entry points of the clip information

20 file associated with the clip file.

Alternatively, a presentation time stamp (PTS) for each of the still images may recorded instead of the duration information. In this case, the optical disk reproducing apparatus performs the slide show in the same manner using the presentation time stamp

25 (PTS) associated with each image to determine when to start displaying the associated still image.

If an entry point also includes audio duration information or audio presentation time stamps (PTS) related to the still image pictures, the optical disk reproducing apparatus performs a slide

30 show in the same manner using the audio duration information or audio presentation time stamps.

The optical disk reproducing apparatus may also perform a browsable slide show in which a plurality of still image pictures

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are displayed with unlimited duration. In a browsable slide show,
the optical disk reproducing apparatus skips between playing
still images based on user input. Fig. 7 illustrates an example
of a browsable slide show performed based on the above-described
5 embodiments according to exemplary embodiments of the present
invention. As shown, a playlist includes first-third playitems
PlayItem 1, PlayItem 2 and PlayItem 3. Each of the first-third
playitems PlayItem 1, PlayItem 2 and PlayItem 3 includes
information for reproducing one or more still image pictures from
10 one or more clip files including still image pictures.

   As shown in Fig 7, the portion of the clip file referenced
by the first playitem PlayItem 1 includes at least first, second
and third pictures Pic. 1, Pic. 2 and Pic. 3. Fig. 7 further
graphically illustrates that the respective entry points
15 associated with the first, second and third pictures Pic. 1, Pic.
2 and Pic. 3 provide for respective limited display durations
Duration 1, Duration 2, and Duration 3.

   Accordingly, the still image pictures of the first playitem
PlayItem 1 are displayed sequentially. However, if during the
20 display of a still image picture the optical disk reproducing
apparatus receives user input instructing the display of a
previous or next still image picture, the optical disk reproducing
apparatus ends display of the current still image picture and
displays the previous or next still image picture. Fig. 7
25 illustrates the example where during the display of the second
still image picture Pic. 2, user input instructing display of a
next still image picture is received. When the request is received,
the optical disk reproducing apparatus refers to the entry point
for the next still image picture; namely, the entry point
30 following the entry point for the currently displayed still image.
Using this next entry point, the next still image picture Pic.
3 is displayed. Fig. 7 further illustrates the example where
during the display of the third still image picture Pic. 3, user

input instructing display of a previous still image picture is received. When the request is received, the optical disk reproducing apparatus refers to the entry point for the previous still image picture; namely, the entry point preceeding the entry

5 point for the currently displayed still image. Using this previous entry point, the previous still image picture Pic. 2 is displayed.

As further shown in Fig. 7, if audio data is associated with each still image picture, then the user input also effects changes in the reproduced audio data in the same manner as described above

10 with respect to the video data for the still image pictures.

It will further be appreciated from Fig. 7 that the browsable slide show takes place with respect to still image pictures having limitless display durations such as shown in the second playitem PlayItem 2. The skipping from one still image picture to a next

15 or previous still image picture takes place in the same manner as described above with respect to the first playitem PlayItem 1.

Fig. 8 illustrates a schematic diagram of an embodiment of an optical disk recording and reproducing apparatus according to

20 the present invention. As shown, an AV encoder 9 receives and encodes data (e.g., still image data, audio data, etc.). The AV encoder 9 outputs the encoded data along with coding information and stream attribute information. A multiplexer 8 multiplexes the encoded data based on the coding information and stream attribute

25 information to create, for example, an MPEG-2 transport stream. A source packetizer 7 packetizes the transport packets from the multiplexer 8 into source packets in accordance with the audio/video format of the optical disk. As shown in Fig. 8, the operations of the AV encoder 9, the multiplexer 8 and the source

30 packetizer 7 are controlled by a controller 10. The controller 10 receives user input on the recording operation, and provides control information to AV encoder 9, multiplexer 8 and the source packetizer 7. For example, the controller 10 instructs the AV

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encoder 9 on the type of encoding to perform, instructs the
multiplexer 8 on the transport stream to create, and instructs the
source packetizer 7 on the source packet format. The controller
10 further controls a drive 3 to record the output from the source
5 packetizer 7 on the optical disk.

The controller 10 also creates the navigation and management
information for managing reproduction of the data being recorded
on the optical disk. For example, based on information received
via the user interface (e.g., instruction set saved on disk,
10 provided over an intranet or internet by a computer system, etc.)
the controller 10 controls the drive 3 to record one or more of
the data structures of Figs. 1-7 on the optical disk.

During reproduction, the controller 10 controls the drive 3
to reproduce this data structure. Based on the information
15 contained therein, as well as user input received over the user
interface (e.g., control buttons on the recording and reproducing
apparatus or a remote associated with the apparatus), the
controller 10 controls the drive 3 to reproduce the data from the
optical disk. For example, as discussed above with respect to the
20 embodiments of the present invention, a still image or still images
may be reproduced in association with audio data based on the
navigation information. Furthermore, an image or group of images
may be reproduced as a slideshow or portion of a slideshow. As also
discussed, a slideshow may be synchronized, browsable, etc.

25   The reproduced source packets are received by a source
depacketizer 4 and converted into a data stream (e.g., an MPEG-2
transport packet stream). A demultiplexer 5 demultiplexes the data
stream into encoded data. An AV decoder 6 decodes the encoded data
to produce the original data that was feed to the AV encoder 9.
30 During reproduction, the controller 10 controls the operation of
the source depacketizer 4, demultiplexer 5 and AV decoder 6. The
controller 10 receives user input on the reproducing operation,
and provides control information to AV decoder 6, demultiplexer

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5 and the source packetizer 4. For example, the controller 10
instructs the AV decoder 9 on the type of decoding to perform,
instructs the demultiplexer 5 on the transport stream to
demultiplex, and instructs the source depacketizer 4 on the source
5 packet format.

   While Fig. 8 has been described as a recording and reproducing
apparatus, it will be understood that only a recording or only a
reproducing apparatus may be provided using those portions of Fig.
8 providing the recording or reproducing function.

10   As will be appreciated from the forgoing disclosure, the
present invention provides a recording medium having a data
structure for managing still images recorded on a high-density
recording medium (e.g., a high-density optical disk such as a
BD-ROM). For example, the data structure allows for displaying
15 still images and possibly audio data in various ways.

   As apparent from the above description, the present invention
provides methods and apparatuses for recording a data structure
on a high density recording medium for managing still images
recorded on the recording medium.

20   The above description further provides methods and apparatus
for reproducing still images recorded on a high density recording
medium based on a data structure, also recorded on the high density
recording medium, for managing the reproduction of still images.

   While the invention has been disclosed with respect to a
25 limited number of embodiments, those skilled in the art, having
the benefit of this disclosure, will appreciate numerous
modifications and variations there from. For example, while
described with respect to a Blu-ray ROM optical disk in several
instances, the present invention is not limited to this standard
30 of optical disk or to optical disks. It is intended that all such
modifications and variations fall within the spirit and scope of
the invention.

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CLAIMS

1. A recording medium having a data structure for managing reproduction of at least one still image recorded on the recording medium, comprising:

5   a recording area recording a clip stream file and a clip information file associated with the clip stream file, the clip stream file including at least video data for a still image, the clip information file including at least an entry point map, the entry point map including an entry point, the entry point providing

10 at least an address of the still image.

2. The recording medium of claim 1, wherein the entry point provides at least a start address of the video data forming the still image.

3. The recording medium of claim 1, wherein the entry point

15 maps a presentation time of video data forming the still image to an address of the video data forming the still image.

4. The recording medium of claim 1, wherein

the clip stream file includes at least video data for more than one still image;

20   the entry point map includes an entry point associated with each still image, and each entry point provides at least an address of the associated still image.

5. The recording medium of claim 4, wherein each entry point provides at least a start address of the video data forming the

25 associated still address.

6. The recording medium of claim 4, wherein each entry point maps a presentation time of the associated still image to the address of the associated still image.

7. The recording medium of claim 1, further comprising:

30   a playlist stored in the recording area, the playlist including at least one playitem indicating at least a portion of

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the video data in the clip stream file to reproduce, the portion of the video data in the clip stream file including the still image.

8. The recording medium of claim 7, wherein

the recording area further includes another clip stream file,
5   and the another clip includes at least audio data; and

the playlist further includes at least one sub-playitem indicating a portion of the audio data to reproduce.

9. The recording medium of claim 8, wherein the playitem and sub-playitem provide for reproducing the clip stream file and the
10 another clip stream file such that the video data and the audio data are played in time synchronization with one another.

10. The recording medium of claim 9, wherein the playitem indicates a start point and an end point for reproducing the video data of the clip stream file and the sub-playitem indicates a start
15 point and an end point for reproducing the audio data of the another clip stream file.

11. The recording medium of claim 8, wherein the playitem indicates a start point and an end point for reproducing the video data of the clip stream file and the sub-playitem indicates a start
20 point and an end point for reproducing the audio data of the another clip stream file.

12. The recording medium of claim 7, wherein the playitem indicates to reproduce the still image.

13. The recording medium of claim 12, wherein the playitem
25 further indicates a duration to display the still image.

14. The recording medium of claim 1, further comprising:

a playlist stored in the recording area, the playlist indicating to reproduce the still image in the clip stream file.

15. The recording medium of claim 14, wherein
30   the clip stream file includes video data representing more than one still image; and

the playlist indicates timing for sequentially reproducing a number of the still images.

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16. The recording medium of claim 14, wherein

the clip stream file includes video data representing more than one still image; and

the playlist provides for selectively reproducing the still
5   images.

17. A method of recording a data structure for managing reproduction of at least one still image on a recording medium, comprising:

recording a clip stream file and a clip information file
10 associated with the clip stream file on the recording medium, the clip stream file including at least video data for a still image, the clip information file including at least an entry point map, the entry point map including an entry point, the entry point providing at least an address of the still image.

15   18. A method of reproducing a data structure for managing reproduction of at least one still image recorded on a recording medium, comprising:

reproducing a clip stream file and a clip information file associated with the clip stream file from the recording medium,
20 the clip stream file including at least video data for a still image, the clip information file including at least an entry point map, the entry point map including an entry point, the entry point providing at least an address of the still image.

19. An apparatus for recording a data structure for managing
25 reproduction of at least one still image on a recording medium, comprising:

a driver for driving an optical recording device to record data on the recording medium;

a controller for controlling the driver to record a clip
30 stream file and a clip information file associated with the clip stream file on the recording medium, the clip stream file including at least video data for a still image, the clip information file including at least an entry point map, the entry point map including

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an entry point, the entry point providing at least an address of
the still image.

    20. An apparatus for reproducing a data structure for
managing reproduction of at least one still image recorded on a
5 recording medium, comprising:

    a driver for driving an optical reproducing device to
reproduce data recorded on the recording medium;

    a controller for controlling the driver to reproduce a clip
stream file and a clip information file associated with the clip
10 stream file from the recording medium, the clip stream file
including at least video data for a still image, the clip
information file including at least an entry point map, the entry
point map including an entry point, the entry point providing at
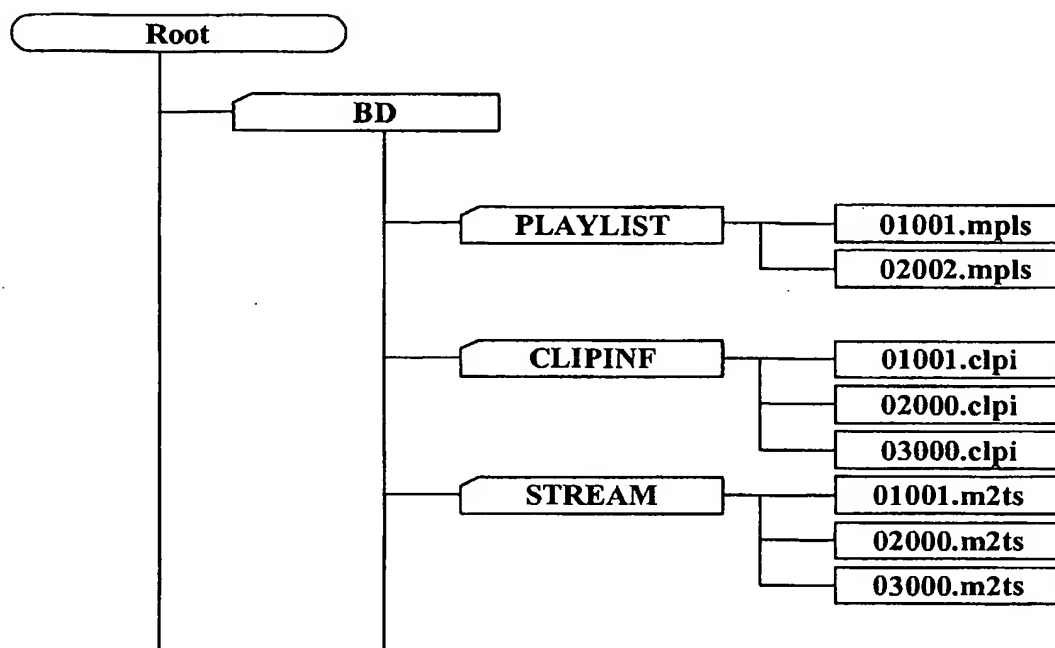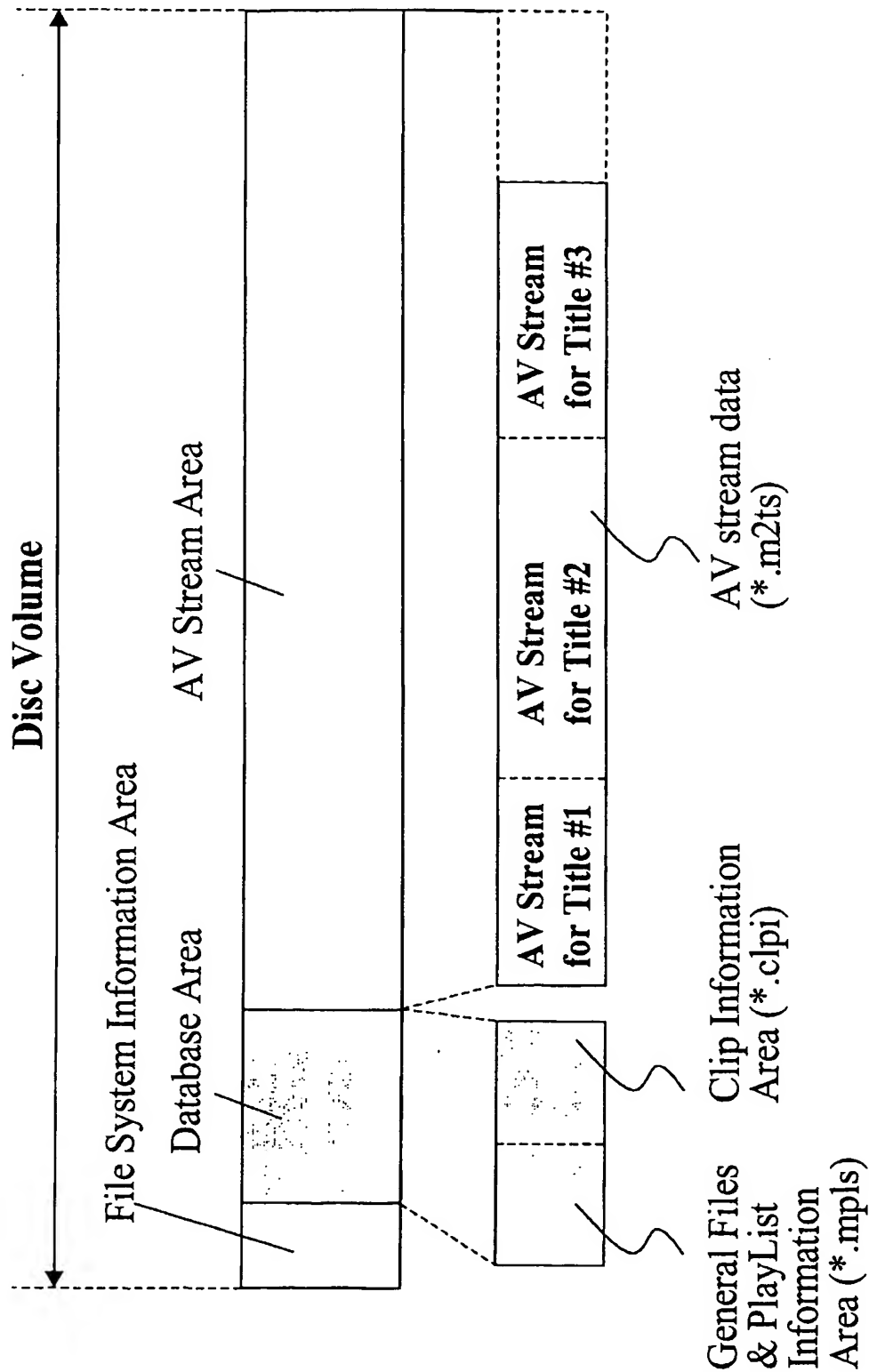least an address of the still image.

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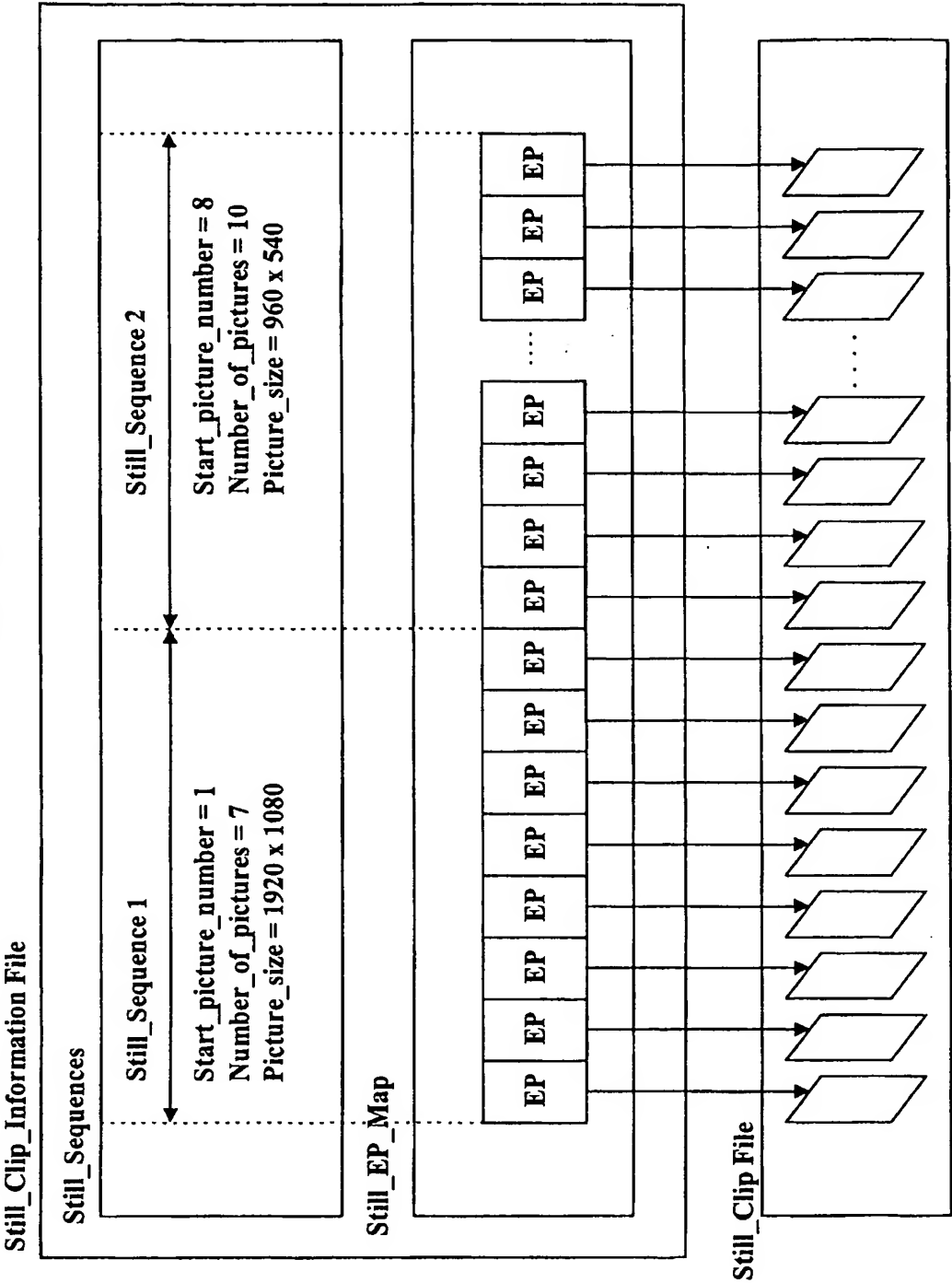WO 2004/047103   PCT/KR2003/002511

FIG. 1

```
┌─────────────┐
│    Root     │
└─────────────┘
      │
      └──┌─────────────┐
         │     BD      │
         └─────────────┘
               │
               ├──┌─────────────┐    ┌──────────────┐
               │  │  PLAYLIST   │────│  01001.mpls  │
               │  └─────────────┘    ├──────────────┤
               │                     │  02002.mpls  │
               │                     └──────────────┘
               │
               ├──┌─────────────┐    ┌──────────────┐
               │  │   CLIPINF   │────│  01001.clpi  │
               │  └─────────────┘    ├──────────────┤
               │                     │  02000.clpi  │
               │                     ├──────────────┤
               │                     │  03000.clpi  │
               │                     ├──────────────┤
               └──┌─────────────┐    │  01001.m2ts  │
                  │   STREAM    │────├──────────────┤
                  └─────────────┘    │  02000.m2ts  │
                                     ├──────────────┤
                                     │  03000.m2ts  │
                                     └──────────────┘
```

FIG. 2

FIG. 3

Still_Clip_Information File

Still_Sequences

Still_Sequence 1

Start_picture_number = 1
Number_of_pictures = 7
Picture_size = 1920 x 1080

Still_Sequence 2

Start_picture_number = 8
Number_of_pictures = 10
Picture_size = 960 x 540

Still_EP_Map

EP

Still_Clip File

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FIG. 4

Case 1 : Picture Duration Limit
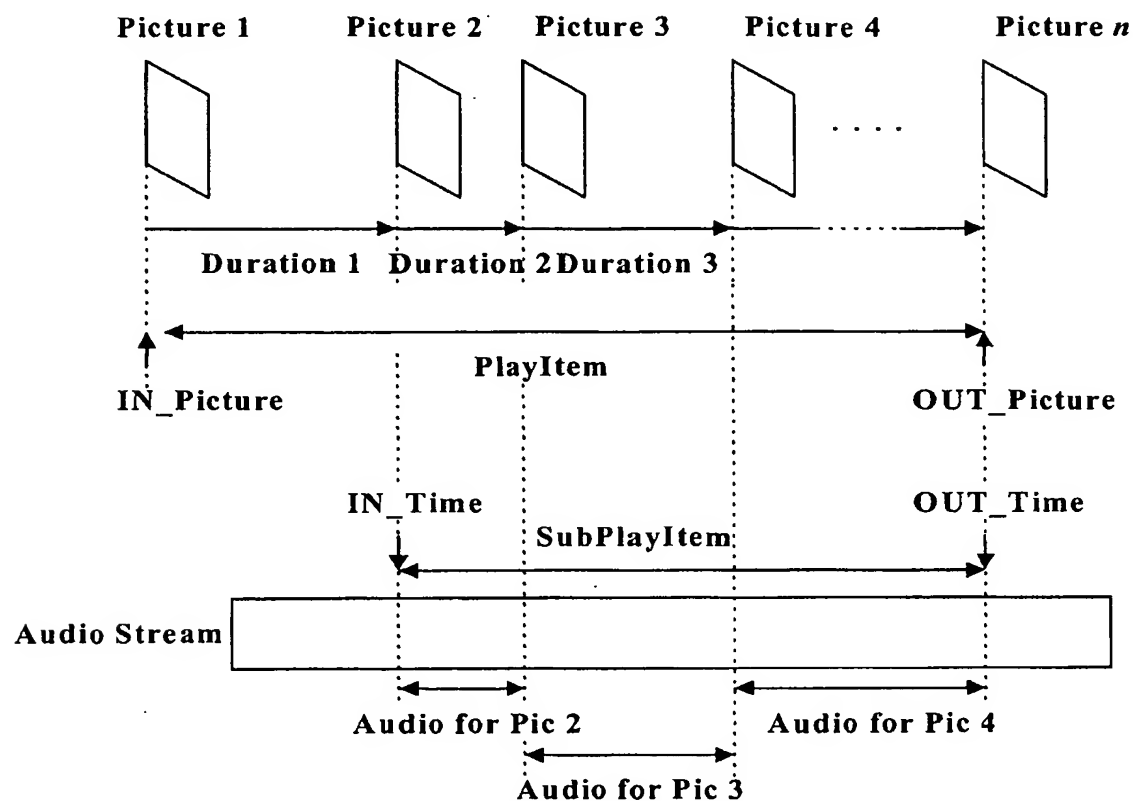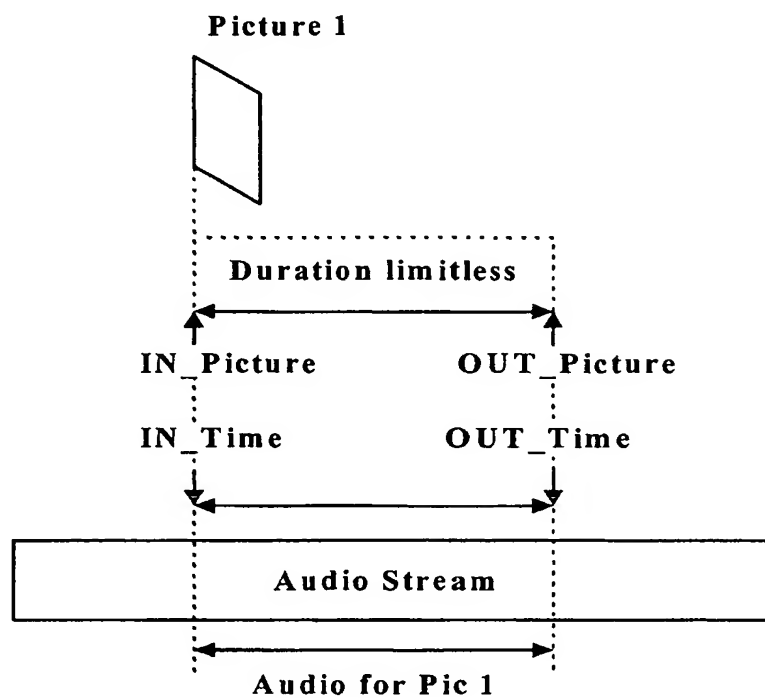
FIG. 5

Case 2 : Picture Duration Limitless

Picture 1

Duration limitless

IN_Picture   **OUT_Picture**

IN_Time   **OUT_Time**

Audio Stream

Audio for Pic 1

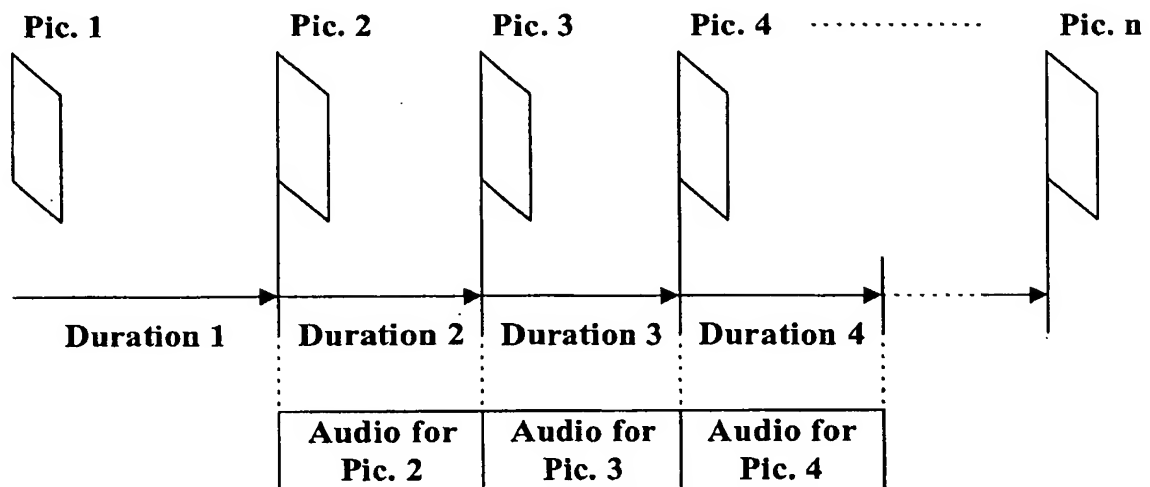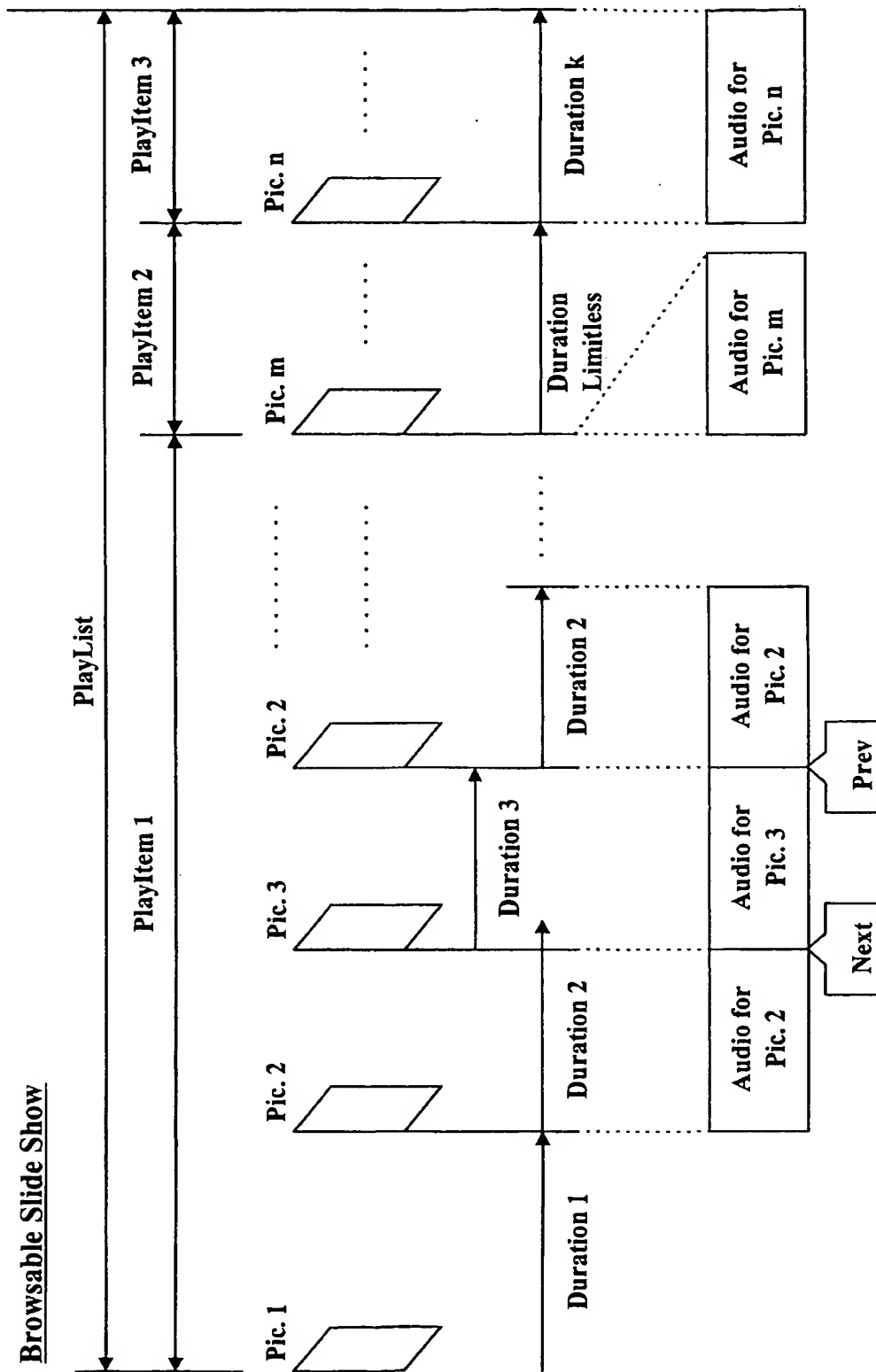# FIG. 6

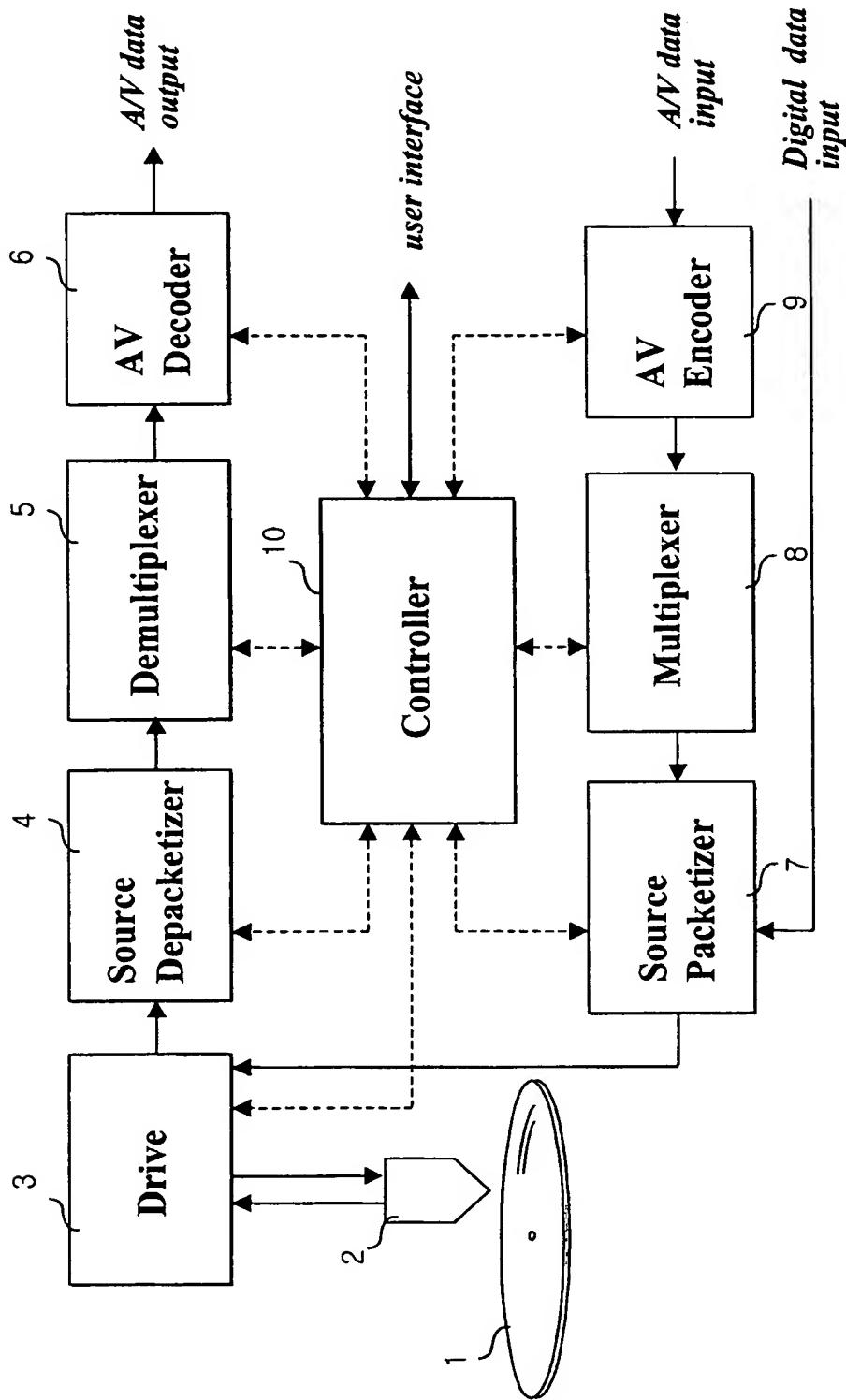**Slide Show**

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FIG. 7

FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2003/002511

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 G11B 20/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G11B 20/10 H04N 5/92 G11B 27/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Patents and applications for inventions since 1975
Korean Utility models and applications for utility models since 1975

Electronic data base consulted during the intertnational search (name of data base and, where practicable, search terms used)
"still image or picture", "clip", "optic* disc or disk"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	WO 2000/055857 A1 (Matsushita Electric Industrial Co.) 21 SEPTEMBER 2000 See the whole documents	1, 17-20 2-16
A	EP 1204269 A1 (Hitachi Ltd.) 08 MAY 2002 See the whole documents	1-20
A	EP 0949825 A1 (Matsushita Electric Industrial Co.) 13 DECEMBER 1999 See the whole documents	1-20
A	US 6,374,037 B1 (Matshita Electric Industrial Co.) 16 APRIL 2002 See the whole documents	1-20
A	US 2002/0127001 A1 (Masanori Gunji et al.) 12 SEPTEMBER 2002 See the whole documents	1-20

☐ Further documents are listed in the continuation of Box C.   ☐ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
26 FEBRUARY 2004 (26.02.2004)	27 FEBRUARY 2004 (27.02.2004)

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